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SMOKE AND OBSCURANT OPERATIONS IN A
JOINT ENVIRONMENT

by

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14. ABSTRACT Throughout this century, smoke and obscurant operations played a major role in military operations. American Forces found many uses for this combat multiplier. From smoke pots and smoke generators to smoke rounds projected from mortar tubes, smoke and obscurant operations significantly affected battlefield conditions. Smoke and obscurant operations are not new to US military operations. In fact, they played a key role in the protection of military assets throughout this century. The United States Army experimented with smoke and obscurants during World War I, then used them extensively during World War II. Additionally, Navy and Air Force personnel used smoke and obscurants across the spectrum of military operations. The Air Force used smoke to mark targets and control flights in mid-air, while the Navy used smoke to conceal vessels at sea and protect them from air attacks. Examining operations during several conflicts throughout our history shows that smoke operations supported river crossings, obstacle emplacements, screened troop movements, and concealed towns and cities during bombing raids. The focus of this paper is on smoke and obscurants as a combat multiplier in Joint Operations. Understanding the historical and current uses of smoke and obscurants by the different services is the basis for determining future requirements for smoke and obscurant operations in the 21st Century.					
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Preface

My first experience with smoke and obscurant operations occurred when I was assigned to the 2d Infantry Division in Korea, as a Second Lieutenant. When rotating combat battalions on the border in the northern section of South Korea, Second Infantry Division used smoke and obscurants to conceal friendly forces moving into defensive positions along the Demilitarized Zone. Using smoke generators mounted on jeeps, the 2d Infantry Division chemical company used its smoke platoon to conduct large area smoke screens to conceal friendly force movements from direct observation of the North Korean Army. Just a couple years later while serving as a Chemical Company Executive Officer in the Federal Republic of Germany, I participated in the fielding and training of the Army's first mechanized smoke platoon. Mechanized smoke platoons are comprised of smoke systems mounted on armored personnel carriers. Mounting smoke systems in this manner allows smoke units to operate forward on the battlefield to support friendly force combat operations.

During Operation Desert Storm I commanded a mechanized smoke company that provided smoke and obscurant support to VII Corps forces. I participated in numerous exercises and real world missions using smoke and obscurants. While most of these exercises involved only Army forces, I am convinced that smoke and obscurants can provide force protection and be a combat multiplier to the other services as well.

My interest in smoke and obscurants and their battlefield effects are the primary reasons that I chose this topic to research. Several people assisted me in my research efforts. I especially thank Mr. Pastorett, Librarian at the United States Army Chemical School for his help in locating sources of information for this project, and to LTC Arthur Connor for his guidance and candid advice. As my Army advisor during Air Command and Staff College and faculty advisor for this research project, LTC Connor provided sound counsel that helped focus my efforts. Additionally I thank my wife, Maureen, for her support and encouragement.

Abstract

Throughout this century, smoke and obscurant operations played a major role in military operations. American Forces found many uses for this combat multiplier. From smoke pots and smoke generators to smoke rounds projected from mortar tubes, smoke and obscurant operations significantly affected battlefield conditions. Smoke and obscurant operations are not new to US military operations. In fact, they played a key role in the protection of military assets throughout this century. The United States Army experimented with smoke and obscurants during World War I, then used them extensively during World War II. Additionally, Navy and Air Force personnel used smoke and obscurants across the spectrum of military operations. The Air Force used smoke to mark targets and control flights in mid-air, while the Navy used smoke to conceal vessels at sea and protect them from air attacks.

Examining operations during several conflicts throughout our history shows that smoke operations supported river crossings, obstacle emplacements, screened troop movements, and concealed towns and cities during bombing raids. The focus of this paper is on smoke and obscurants as a combat multiplier in Joint Operations. Understanding the historical and current uses of smoke and obscurants by the different services is the basis for determining future requirements for smoke and obscurant operations in the 21st Century..

Chapter 1

Introduction

Major Murphy told me that he could not add smoke in the plan since the stencil had already been cut. That was one of the most foolish remarks that I heard during World War I.

—General George S. Patton, Jr.¹
Patton's Diary, September 8, 1918

Since World War I, smoke and obscurants on the battlefield have significantly affected military operations. From the Battle of Jutland in World War I, to the deserts of Southern Iraq and burning oil fields of Kuwait, obscurants have concealed friendly forces and kept enemy forces from seeing units, equipment and terrain on the battlefield. After examining the dynamic role of smoke and obscurants in military operations throughout this century, I conclude that we will need these elements on the 21st Century battlefields. Our power projecting, capabilities based force must be equipped and trained to continue to defend United States national interests and those of our allies. Scarce resources and even tighter budget constraints will force military leaders to make tough decisions about the types of military equipment and employment methods they will use on future battlefields. Current military technology and continuing improvement of smoke and obscurant employment methods will enhance the United States' ability to win conflicts in the future. Concealing friendly forces will always be an essential tool for military

leaders. Regardless of cost, smoke and obscurants are critical to battlefield dominance today and will be just as important in the future.

Twenty-first Century battlespace requires total control of smoke and obscurant operations.² Through total control of smoke and obscurants operations, US forces will be able to manipulate battlespace conditions and determine the level of fog and friction on the battlefield. Future smoke and obscurants must be designed to deny an enemy the ability to visualize battlefield conditions, and at the same time not close windows of visibility for friendly force commanders. Potential threat countries are introducing advanced tactical sensors for their acquisition and surveillance systems.³ Smoke and obscurants of the future must be designed to thwart these advanced sensors and systems to assist US commanders in controlling the battlespace.

Military commanders used some form of smoke and obscurants to mask the movement of attacking troops well before the modern era. In *Macbeth*, Shakespeare described the most basic obscurant, “taking advantage of natural cover or darkness to surprise the enemy or to conceal the direction of an attack, was fundamental knowledge, even among savages.”⁴ Using both man-made and natural elements to shield friendly forces is a practice long regarded as one that could potentially provide the attacker with an element of surprise. In *Macbeth*, we also see an example of the use of obscurants as a means of deception. As forces advance through Birnan Wood to Dunsinane, their instructions are to “Let every soldier hew him down a bough and bear it before him, thereby shall we shadow the number of our host, and make discovery err in report of us.”⁵

When used with other elements of combat power, smoke-screening operations can provide a commander with another tool to help preserve combat strength and flexibility.

Commanders must intentionally incorporate smoke and obscurant planning into military operations planning. Although smoke and obscurant operations are not the decisive factors in wars, history has shown that if they are used properly, they can influence the outcome of battles.

Smoke and obscurant use has varied over the years. Smoke and obscurants have screened river crossings and logistics bases, marked lead aircraft in flights, and provided cover for ships at sea. Smoke grenades have marked drop zones for medical evacuation helicopters and signaled to lift or shift fires for units in contact. The number and variety of smoke missions has increased continually over the years. For their continued use, however, it is imperative that technological advancements of smoke operations keep pace with technological advances of other weapon systems.

The following scenario is an example of how smoke and obscurants can continue to play a role in the high-tech warfighting atmosphere of the 21st century. Let's imagine the military of 2020, with its digitized battlefield and state of the art weapons technology. A new President and Congress are confronted with the task of exercising military power to protect Kuwait, a country rich with oil and vital to the world's economy. Located just a few miles away from Kuwait is Iraq, which imposes its will and forces its military might on its neighbors, as well as influencing oil production and distribution in the region. The military influence of Iraq not only affects the Middle Eastern region, but also the economic well being of the entire global community.

The US National Command Authority decides to deploy a Joint Task Force to the area to support their objective of ensuring continued peace in Southwest Asia. Limited resources hinder the task force from carrying out the mission of providing regional

stability. At the time we pick up their story, Joint Task Force 2020 has conducted operations in Kuwait for ten days. The primary thrust of Joint Task Force 2020 operations up to this point concentrated on force build up in the theater of operations. The secondary effort was movement of the Joint Task Force ground maneuver units into forward assembly areas for pre-combat operations. While Kuwait has managed to avoid armed conflict with Iraq for the past twenty years, indications were that a ground attack by Iraq was imminent. United States intelligence efforts suggested that Iraq was postured for a massive ground offensive attack. Intelligence efforts also indicated that Iraq had access to satellite imagery focusing over Kuwait twice daily. In response, the National Command Authority directed the regional commander to deploy forces in forward defensive positions to prepare to defeat the Iraqi military, and to assist Kuwait in maintaining its sovereignty.

Early in the planning process, the JTF commander expressed concern in two areas. One was concealment of airfield and port operations during the build up of troops, and the other was concealment of combat and logistics assets in forward assembly areas. During the ten days of build up and defensive preparations, United States forces operated under a continuous light smoke haze during both daylight and hours of darkness. Smoke and obscurants over ports, airfields and other selected locations succeeded in prohibiting the Iraqis from observing the extent of US force build up in Kuwait with their satellites and surveillance aircraft.

Iraqi government and military leaders knew that a United States led coalition was forming in Kuwait, but they could neither determine the extent of the build up, nor observe defensive preparations in the forward assembly areas. The JTF commander used

smoke to obscure and deceive. While there were actually only two assembly areas used by the JTF, five areas were covered by smoke and obscurants. The Iraqis believed that US personnel were operating in all five areas covered by smoke.

Although Iraq never invaded Kuwait, senior Iraqi officials later acknowledged they believed the US had deployed far more ground, naval, and air assets into the region than they actually did. Iraqi senior military and government officials acknowledged that their satellite imagery and aircraft reconnaissance efforts were virtually useless. Iraqis were unable to observe or determine many needed details such as troop strength and disposition of forces of the US led build up into the region.

While this account is fictional, it is one of many that could potentially occur as we draw down our forces, and continue to project power and display resolve throughout hostile regions of the world. Smoke and obscurants can be critical to successful military operations, especially when resources are limited. We have records of the effects of smoke and obscurants in previous conflicts, but how will they be used in the future? Through studying how different military services have used smoke and obscurants in military operations throughout our history, I will attempt to answer that question. In particular, I will review how the Army has used smoke and obscurants in the past and examine the Army's vision for smoke and obscurants for the future. The Army's position on smoke and obscurants is significant in this study because of the role the Army plays in battlefield dominance. Additionally, the Army's position on smoke and obscurants will influence smoke operations for the entire joint environment.

The study of smoke and obscurant history provides many examples of how effective the use of smoke was during several periods of armed conflict. I will provide a few

important examples of how that smoke was used, in order to show its effectiveness today and in the 21st Century. The primary question that I will focus on is, “Have smoke and obscurant operations outlived their effectiveness, and do they have a role in the Joint Environment?” While my research will be centered on answering that question, I will also examine a few of the roles that smoke and obscurants played in our military history. I will look at the impact of those operations during several periods of our history and look at possible uses of smoke and obscurants in the future. Since World War I, smoke and obscurants have played a vital role in US force protection on the battlefield. While this role will take on new meaning in the highly technological combat environment of the future, the use of obscurants will remain the combat multiplier that it is today.

The limitations of this paper include studies and reports that are classified. My research was purposefully restricted to unclassified materials to keep this project unclassified. I believe that sufficient unclassified materials were available for my research.

Notes

¹ TRADOC Pamphlet 525-3, *US Army Operations Concept for Smoke and Obscurant Employment and Countermeasures* (Ft. Monroe, VA: US Army Training and Doctrine Command, Draft), 2.

² Ibid.

³ Bettie B. Gonser, Revised Required Operational Capability (ROC) for the Generator, Smoke Mechanical: Motorized and Mechanized Smoke Generator Carrier for Dual Purpose Units, XM56, (Ft. Monroe, VA: US Army Training and Doctrine Command, 23 Jul 1993).

⁴ Paper produced by Chemical Warfare Service around 1927, Edgewood Arsenal, Maryland.

⁵ Ibid.

Chapter 2

Historical Uses of Smoke and Obscurants

Intellectuals ought to study the past not for the pleasures they find in so doing, but to derive lessons from it.

—Cheika Anta Diop¹

We study military history for several reasons. One reason for studying military history is to learn lessons from the past so that they can be applied to the future. Another reason for studying military history is to better understand the role of each of the components that aided in successful military operations. We must not only study successful operations, but cases of failure as well. Lessons from history are truly learned when we take the time to understand their impact on our current and future situations, and apply them when making decisions. For this reason, it is imperative that we at least study and become aware of the role of smoke and obscurants in our past conflicts.

During World War I, the United States realized a need for obscurants on the battlefields. With the extended range of indirect fire systems and the mobility offered by naval vessels, battlefield operations began taking on new dimensions. Commanders realized that unassisted frontal assaults were perhaps an obsolete method of warfighting. The requirement to conceal forces and vital assets gained momentum as the war progressed. As smoke and obscurants gained popularity, the military conducted several smoke experiments during this period. The use of white phosphorus and other types of

smoke became a focal point of experiments for the newly established Chemical Warfare Service of the Army. After World War I, the Chemical Warfare Service continued experimenting to learn more about the affect of smoke and obscurant operations on the battlefield. One study was aimed at determining the tactical value of blinding smoke in preventing aimed rifle fires from hitting their targets. The results of this study are shown at Table 1. While this is only one example of the impact of smoke on operations, studies such as this one prompted the military to seriously consider the advantages of using smoke and obscurants on the battlefield.

Table 1 Tactical Value of Blinding Smoke in Preventing Aimed Rifle Fire

Stage #	Conditions	Shots Fired	Hits	Percent Hits
1 st	No smoke	66	38	58%
2 nd	Smoke on target	75	8	11%
3 rd	Smoke on Firing line	75	2	3%

Source: Study conducted on 15 March 1927 by Major Leigh F. J. Zerbee, Chemical Warfare Service, Assistant Commandant, Chemical Warfare School, Aberdeen Proving Ground, Maryland

World War II

In the early morning of 7 July 1943 the port, lake, channel, outer harbor and bay at Bizerte were crowded with US ships concentrated for the impending Allied invasion of Sicily.² Around 4 a.m. on 7 July, approximately 60 German aircraft launched an attack on the port areas of Bizerte. Though the attack lasted for more than half an hour, German airplane pilots could not locate their targets. Just minutes before German planes descended upon Bizerte, US forces used smoke generators to create a dense fog over the area. Within the screened area, not one bomb hit its target, nor was a single ship damaged.³ The enemy raid on Bizerte failed primarily because of the blanket of oil smoke US troops made using the M1 mechanical smoke generator. The M1 generator

was the first mechanical generator used for large area smoke and obscurant screening by US forces during World War II. While the use of smoke operations was gaining momentum, the M1 was not even on the drawing boards at the beginning of the war. The M1 smoke generator was quickly fielded in 1942 to save lives and equipment for situations such as Bizerte.

Smoke and obscurants were used extensively during World War II. In 1943, forty smoke generator units were on active duty in the various military theaters.⁴ Using the M1 generator as the primary smoke system, smoke units provided commanders with sufficient personnel and equipment to handle large area operations. Allied commanders realized the importance of screening their forces and logistics sites to keep them free from the harassing attacks of the German war machine. Though ground forces and naval forces were finding many uses for realizing the potential for smoke and obscurants, they were not alone. In addition to ground force use of smoke in World War II, the US Army Air Forces found several important uses for smoke and obscurants as well.

United States XX Bomber Command conducted several smoke experiments that led to a variety of smoke and obscurant use. XX Bomber Command realized that smoke and obscurants enhanced their survivability as well as lethality. Some of the experiments conducted by the command were aimed at devising suitable methods of marking formation assembly points for bombers in the air.⁵ The command wanted a method that would allow better identification of their assembly points. Identifying assembly points from 20 miles away was considered to be an effective manner to consolidate aircraft in the air to maximize bombing lethality over a target. Additionally, XX Bomber Command conducted experiments with F. S. Smoke mixture (Sulfur trioxide-chlorosulfonic Acid

solution) and WP (White Phosphorus) smoke.⁶ In these experiments, smoke was released at assembly points by the first aircraft on station to assist the other aircraft in expeditiously finding the assembly area. Test results were so successful that the analysis section of XX Bomber Command recommended “that this proposed system of assembly point markings immediately be employed on at least three combat missions of this command, and if satisfactory be incorporated into the tactical doctrine.”⁷ Even though the war was ongoing, XX Bomber Command continued to search for ways to employ smoke tactics to enhance the lethality of their bombers.

Smoke proved to be useful not only in screening troops and equipment, but in aircraft identification as well. Air to air homing was another method enhanced by smoke. The Air Corps realized they needed a better and more effective means of identifying the lead aircraft. Before using smoke, the lead aircraft would circle in one direction while the other aircraft, which were to assemble on him, circled in the opposite direction.⁸ XX Bomber Command desired a method that could quickly and precisely identify an aircraft as the lead plane in the formation. WP Smoke and colored smoke filled this void. After many experiments that included injecting smoke production materials into the engine exhaust, XX Bomber Command finally found ways to better identify the lead aircraft. While the smoke injection method was not advantageous, the analysis section of XX Bomber Command did recommend the use of WP smoke grenades in conjunction with 100lb. M47A2 (WP filled) bombs for assembly point markings.

United States forces were not alone in using smoke and obscurants during World War II. British forces used large area smoke screens to protect their towns, cities and industrial centers from the German Bombing during 1940–1941.⁹ British military leaders

realized they could not fend off the massive attacks of the Germans but learned they could protect their assets by hiding them from the German bombers. Prior to 1941, German bombing campaigns were very effective against British cities. Reacting to lessons learned from the past, British forces were familiar with the concept of large area smoke screening. Twenty years earlier, during World War I, the British successfully used smoke and obscurants to conceal their own operations during the Battle of Jutland. Massive German bombing campaigns would have devastated the British forces, and the British knew they had to take measures to conceal their most vital assets with visual obscuration.

One method the British used to protect their industrial centers involved the use of smoke pots and British civilians. Under the Civilian Defense Program, civilians living near industrial complexes would come out during alerts and ignite smoke pots pre-positioned in the area.¹⁰ A massive smoke build up occurred once the pots were ignited, which resulted in huge smoke clouds covering the industrial centers. The smoke clouds prevented the German bombers from locating their targets.

Korean War

As the United States found itself in yet another conflict, smoke generator units again conducted operations to help protect our soldiers in combat. Lessons learned from smoke operations in World War II were invaluable, and again smoke generator units served throughout the front lines and conducted operations in the rear as well. Research and development on smoke producing equipment was continued between World War II and the Korean Conflict.¹¹ Since many US commanders served during both World War II and the Korean War, they knew first hand the role smoke and obscurants could play in

Korea. Because the Chemical Warfare Service continued to experiment and train with smoke and obscurants, smoke companies became a versatile part of the US military force. Smoke operations in Korea were highly mobile, and this afforded commanders a number of options for smoke emplacement on the battlefields. On the front lines, smoke unit missions included providing direct concealment for units in contact. Not only were the smoke units providing front line support, but they continued to support rear areas as well. At the start of the Korean War, there was only one chemical battalion headquarters on active duty, but this changed quickly. Additional Chemical Battalion headquarters were quickly brought back to active duty to command the separate smoke companies operating in Korea. Command and control for smoke units in Korea was ever changing. Smoke units in the rear were normally attached to supply and logistics organizations while units in the front were normally attached to Corps Headquarters. The significance of this command and control dilemma became more critical as the conflict progressed. Smoke units were given more missions throughout the entire area of operations. Even missions in the rear became much more important as operations continued to grow.

The most important rear area smoke-screening mission assigned to the US Chemical Corps during the Korean War was screening the port area at Pusan.¹² Pusan was of vital importance to not only the United States forces in Korea but to the United Nations as well. Nearly all United Nations supplies and troops that entered Korea landed at Pusan. Because of its strategic significance, the port of Pusan was a most logical target for potential devastating enemy air attacks.¹³ With the training smoke units received during and after World War II, and the mobile platforms they were now using, smoke units became the obvious choice to aid in force protection measures in the Pusan Port area.

The threat posed by enemy aircraft on the logistics sites in Pusan led to the positioning of smoke generator companies around the area to produce smoke cover in the event these facilities were attacked.¹⁴ In addition to Pusan, smoke generator units were called upon to screen port areas around Inchon as well. At Inchon the quality of support provided was just as effective.

Some of the fiercest fighting during the Korean War occurred on and around Pork Chop Hill in 1953. Eighth United States Army considered this hill to be of significant importance. Infantry soldiers fought to hold and maintain this hill, and were aided by soldiers whose main mission was to provide cover and concealment smoke for combat operations. The struggle for Pork Chop Hill became part of the legend of the US Army in Korea, reflecting the courage of the defenders and the tactical futility of so many small-unit actions of the kind that dominated the last two years of the war.¹⁵ Smoke units in Korea proved their value by providing smoke screens for logistics sites and other vital areas in the rear as well as on the front lines. Smoke units were “forced to train men not only for proficiency in performing their basic mission, but personnel also had to be prepared to fight as infantry.”¹⁶ Support provided to Pork Chop Hill was one of the true tests for smoke and obscurants in forward areas of operations. One great example involved the 1st Platoon, 333rd Chemical Smoke Generator Company conducting operations in the vicinity of Pork Chop Hill.

Artillery fire from North Korean Army units significantly hampered the resupply of friendly forces on Pork Chop Hill. At the same time friendly and enemy forces were engaged in combat actions and dug into trenches only several hundred yards apart. The smoke platoon was called upon to provide screening smoke to blind the enemies’ forward

observers and allow resupply efforts to continue. Blinding smoke created by smoke systems denied observers the ability to locate targets and register artillery rounds. “The screen laid down by the 333rd served the dual purpose of covering an important road construction project and also protecting supply vehicles as they made their way to the friendly forces dug in on Pork Chop Hill.”¹⁷ As one commander familiar with actions on Pork Chop Hill wrote: “Without this protective smoke daytime traffic in the area would have been impossible ... this operation was of value to the tactical defense in the area.”¹⁸ During the Korean War, there were many examples of smoke and obscurant operations that served as a combat multiplier on the battlefield. Smoke operations on Pork Chop Hill was just one of those examples.

Vietnam

Smoke and obscurant use during Vietnam declined sharply compared to its use during World War II. Because of the gradual build up of forces and dense jungle environment in Vietnam, traditional smoke and obscurant missions that were popular during the Korean War and World War II were not deemed necessary. Smoke and obscurants played a much smaller role during this war, albeit just as significant. American forces used smoke grenades to mark targets, aid friendly aircraft in finding targets, and to assist units in contact with enemy forces. Signaling smoke was in the form of smoke grenades and artillery projected smoke. Medical evacuation helicopters relied on smoke to mark landing zones for evacuation of casualties, when they operated near front lines.

Desert Storm

Army commanders appeared uncertain about the role they wanted smoke and obscurants to play during the Gulf War. In the early stages of Operation Desert Shield, some units were alerted for possible deployment to the gulf, only to be held in queue for several months. Early planning considerations included possible uses of smoke at the ports and airfields to screen port operations and the buildup of US and Coalition Forces in Saudi Arabia. Apparently, at least some planners and commanders were aware of smoke and obscurant history, as they introduced the idea of using smoke units to provide a smoke haze over the ports of Dharan and Al Jubail. While these missions were never executed, they were at least considered. During late December 1990, the US Army's 59th Chemical Company conducted a large area-screening mission near the King Fahd International Airport. With only about ten minutes notice, they demonstrated that they could completely conceal the airport from enemy observation. They later learned this action forced enemy aircraft to climb to an altitude favorable for US Army stinger teams to shoot them down.¹⁹

During the January-February time frame of 1991, several other smoke units participated in the VII US Corps and ARCENT deception plan which was designed to draw Iraqi attention east of the Wadi Al Batin.²⁰ The plan accomplished what the VII Corps and ARCENT commanders intended. Smoke unit missions conducted along the Wadi assisted in forcing the Iraqi military to orient to the southeast, thus making them more vulnerable to the ground forces attack.

United States and coalition forces were not alone in using smoke and obscurants during the Gulf War. While the Air Force recorded great success rates with laser-guided

bombs, they also learned these bombs had limitations. One limitation was that laser designation was not possible through overcast skies, fog or smoke.²¹ When planning, American military commanders must keep in mind that smoke and obscurant operations used by an enemy can influence our combat effectiveness. Iraqi military leaders tried to capitalize on the battlefield benefits of smoke and obscurants by using obscuring smoke to cover decoys and camouflage. Iraqi military leaders also took advantage of natural conditions of blowing sand and smoke from oil fires to hide their forces in the flat Kuwaiti desert terrain²². While these concealment methods hindered coalition forces' visual and infrared observation of Iraqi vehicles and equipment, Iraq was unable to hide all of their forces. Advantages of US weapons technology eventually countered the Iraqi's attempts to use smoke and obscurants on the battlefield.

As pointed out in this chapter, United States military history is full of examples where commanders used smoke and obscurants to gain an advantage over their enemies. During each conflict, commanders used smoke for various reasons such as signaling and marking targets, but throughout history, concealment of forces and equipment has always been the predominant purpose for using smoke and obscurants. Chapter two provided many historical examples to support continued smoke and obscurant use by United States forces. The need to conceal forces and equipment existed in past conflicts and will exist in future conflicts as well. Lessons from history are available to help us in the future, but we must apply those lessons in tactical and operational planning.

Notes

¹ Janet Cheatham Bell Sabayt, comp., *Famous Black Quotations – and Some not so Famous* (Chicago, Illinois: Sabayt Publications, 1986), 30.

² Paul W. Pritchard, Ph.D., "Large-Area Screening in MTO and ETO," Mimeo No. 186 (Edgewood Arsenal, MD: Chemical Corps School, 8 December 1947).

Notes

³ Ibid.

⁴ Historical Branch, Chemical Warfare Service, “Smoke Screening Operations in Korea” (Edgewood Arsenal, MD: Chemical Warfare School, 1956)

⁵ XX Bomber Command US Army Air Corps APO 493, Operations Analysis, *Smoke Signals for Formation Assembly Points*, 28 Dec 1944, 11.

⁶ Ibid., 2.

⁷ Ibid., 5.

⁸ XX Bomber Command US Army Air Corps APO 493, *Smoke Signals as a Means of Identifying the Lead Aircraft of a Formation*, 28 Dec 1944.

⁹ Pritchard, “Large Area Screening in MTO and ETO.”

¹⁰ Ibid.

¹¹ “Smoke Screening Operations in Korea.”

¹² Ibid.

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Max Hastings, *The Korean War* (New York: Simon and Schuster, 1987), 282-283.

¹⁶ XX Bomber Command, *Smoke Signals for Formation Assembly Points*.

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ LTC Darryl W. Kilgore, “Desert Shield/Desert Storm After Action Review” (Fort Hood, TX: 2nd Chemical Battalion, 30 May 1991).

²⁰ Ibid.

²¹ Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey Summary Report* (Washington, D.C., 1993), 227.

²² Ibid., 170.

Chapter 3

US Army Vision for Smoke and Obscurants Operations

First, separate ground, sea, and air warfare is gone forever. If ever again we should be involved in war, we will fight it in all elements, with all services, as one single concentrated effort.

—Dwight D. Eisenhower¹
3 April 1958

When then-President Eisenhower made these remarks, he envisioned services working together closely for the defense of this nation and protection of our vital assets. While this chapter is centered on the Army's role in Battlefield dominance and how smoke and obscurants will enhance that role, it is imperative that the ideas brought out and lessons learned here are applied to the total joint force. The Army's role in smoke and obscurants is pivotal to smoke use in the joint environment. Army doctrine and decisions made by Army leadership will directly influence the use of smoke and obscurants by all US military services in the 21st Century. For this reason, I will examine the Army's vision for smoke and obscurant operations in relation to the joint environment.

Just as US Air Force, Navy and Marine Corps leaders are searching for ways to keep our nation strong in the 21st Century, Army leaders are looking ahead and planning for military dominance in the next century, as well. The vehicle chosen by the Army to lead this charge is vested in the concept of Force XXI Operations, authored by the Army's

Training and Doctrine Command (TRADOC) and published in TRADOC Pamphlet 525-5: Force XXI Operations. Former Chief of Staff of the Army, General Gordon Sullivan, referred to TRADOC Pamphlet 525-5 as “the first step of our doctrinal journey into the future.”² While not telling the Army how to handle the change inherent with moving forward into the 21st Century, the pamphlet “provides TRADOC’s Task Force XXI, Battle Laboratories, doctrine writers, combat developers, and trainers a vision of future conflict for the development of supporting concepts, programs, experiments, and initiatives.”³ Even though the US Army is a doctrinal based Army, pamphlets such as this one are required to provoke thought to keep Army doctrine from becoming stagnant. Additionally, TRADOC Pamphlet 525-5 acts a framework for addressing doctrine, training, leader development, organizations, materiel, and soldiers (DTLOMS).⁴

New ideas are always needed for the development of concepts and technology, not only for improving major weapon systems, but also in developing the full spectrum of military operations. It can be argued that smoke and obscurants have outlived their effectiveness on the battlefields of tomorrow. With the small role smoke played during Vietnam and Desert Storm, compared to operations in Korea and World War II, the idea that smoke has outlived its usefulness on the battlefield, could be a valid argument. In fact, the limited uses of smoke and obscurant operations in those most recent conflicts may even add substance to this argument. However, obscurants have played a significant role in our history on the battlefield, at sea, and in the air. Smoke and obscurants provide the combat commander with critical elements of force protection and ways to preserve combat power. As then-Secretary of the Army, The Honorable Togo West and Chief of Staff of the Army, General Dennis Reimer stated in the FY 97 United States Army

Posture Statement, “We must forge an Army prepared to meet the many new challenges of today’s world. America’s 21st century Army must be a capabilities-based force—a force capable of executing diverse missions across the continuum of conflict.”⁵ Even though West and Reimers’ Posture Statement generally pertains to the Army, its’ vision is relevant to the total joint force. Just as “America’s Army is stalwart in its determination to meet the challenges of today, tomorrow, and the 21st century,”⁶ our total joint force must rise to meet these same challenges.

TRADOC Pamphlet 525-5 not only serves as the tool to solicit thoughts and ideas to meet the challenges of future warfighting, but also serves as the base document to change perception of smoke and obscurant operations. After TRADOC Pamphlet 525-5 was published, the Army charged the US Army Chemical Corps to develop a similar document to enlighten those responsible for conceptualizing future uses of smoke and obscurants on the battlefield. The result was the development of two documents: TRADOC Pamphlet 525-3, *US Army Operations Concept for Smoke and Obscurant Employment and Countermeasures*, and *21st Century Vision for Protecting The Force*, a pamphlet produced by General Ralph Wooten, Chief of Chemical.

The Army’s concept for smoke and obscurants on the battlefield is simply to develop capabilities that enable the commander to fight successfully amidst the fog and friction of the battlefield conditions. In General Wooten’s vision for smoke and obscuration he writes “Smoke and obscuration will be successful when: we are able to open and close windows of observation in the visual, infrared, and millimeter wave spectrum—to protect our force and influence enemy operations, without degrading our operational capability.”⁷ Table 2 provides key components of this concept.

Table 2. Future Smoke and Obscurants⁸

<i>Army Smoke and Obscurants Program must be designed to:</i>	<i>Through:</i>
Protect The Force	Degrade/prevent visual or nonvisual observation, targeting, or acquisition of friendly forces
Shape The Battlefield	Allow the enemy to see what we want him to see, and conceal what we want to conceal; support counter-reconnaissance
Dominate The Electro-Magnetic Spectrum	Tactical commander's quick response tool to open and close 4-dimensional "windows":
Disrupt Enemy Operational Tempo	Slow confuse and desynchronize enemy operations, allows our commanders to thicken the fog of war
Deceive The Enemy	Use to conceal or draw attention to friendly ops, when integrated into a comprehensive deception plan

By conducting numerous studies and tests, joint warfighters are searching for the perfect balance and mix of smoke and obscurants for the 21st Century battlefield. US Army leaders do not plan to tackle this awesome task alone. In fact, the Army's Chemical Research, Development and Engineering Center at Aberdeen Maryland conducts an annual Smoke/Obscurants symposium to solicit ideas from science and technology experts and others, on issues pertaining to smoke and obscurants. The Smoke/Obscurants symposium brings together America's foremost thinkers on future roles of smoke and obscurants in 21st Century battlespace. All services must work together with industry leaders to define and develop capabilities to ensure the US military remains the decisive force that it is today. We must continue developing new obscurants that are able to defeat, control, and dominate the multispectral battlespace of future conflicts.⁹

Smoke and obscurants on the battlefield provide the commander with protection. In the United States Army's "keystone warfighting doctrine"¹⁰, Field Manual 100-5, protection is described as an essential element within the dynamics of combat power.

Maneuver, firepower and leadership combined with protection will significantly influence a battle or campaign and probably will decide the outcome. “Protection conserves the fighting potential of a force so that commanders can apply it at the decisive time and place.”¹¹ Protection alone will not ensure mission accomplishment, but must be integrated with the other aspects of combat power to be effective. Two components of protection are operational security and deception operations, which help keep the enemy from locating friendly units.¹²

Future joint force operational successes require an investment in perfecting capabilities of smoke and obscurants for the 21st Century. While the Army is making that investment through research, development and doctrinal changes, these efforts must be expanded. To ensure battlespace dominance for our total joint force, the other services must aggressively explore smoke and obscurant capabilities as well.

Notes

¹ Special Message to Congress, April 3, 1958, *Dwight D. Eisenhower: Selected Quotations*, (Pentagon Library).

² TRADOC Pamphlet 525-5, *FORCE XXI OPERATION: A Concept for Evolution of Full-Dimensional Operations for the Strategic Army of the Early Twenty-first Century*, (Ft. Monroe, VA: US Army Training and Doctrine Command, 1 August 1994).

³ Ibid., 1.

⁴ Ibid.

⁵ The Honorable Togo D. West, Jr. and General Dennis J. Reimer, *A Statement on the Posture of the United States Army Fiscal Year 1997: Meeting the Challenges of Today, Tomorrow, and the 21st Century*, (Washington, D.C.: Headquarters, Department of the Army).

⁶ Ibid.

⁷ Brigadier General Ralph G. Wooten, U. S. Army, Chief of Chemical, U S Army Chemical Corps, *21st Century Vision, Protecting the Force*, (Ft. McClellan, AL, 1 February 1996).

⁸ Ibid.

⁹ Ibid.

¹⁰ United States Army Field Manual (FM) 100-5, *Operations* (Washington, D.C.: Headquarters, Department of the Army, 14 June 1993) iv.

¹¹ Ibid., 2-10.

Notes

¹² Ibid.

Chapter 4

Technological Effects and Applications of Smoke and Obscurants

The only thing harder than getting a new idea into the military mind, is getting an old one out.

—B. H. Liddell Hart¹

Battlefield obscuration has grown into a complex field of study, incorporating elements of materials science, meteorology, electro-optics, multi-phase physics, mathematics, chemistry, computer science and sensor technology.² What started in World War I as a way to protect friendly forces from small arms fire, has grown into operations that affect nearly every aspect of warfighting today. Technological advances created smoke and obscurants that not only shield friendly forces from the naked eye, but can be used to defeat advanced weapon systems as well. Military applications of smoke and obscurants have obtained a quantum leap in effectiveness due to research and development. Recent involvement of the science community in smoke and obscurant development has resulted in major improvements in smoke and obscurant capability and delivery systems. Developments and applications of smoke and obscurants are directly linked to the field of scientific study spanning the entire electromagnetic spectrum.³

As described in Army Field Manual 3-50, the electromagnetic spectrum is the entire range of radiation that includes cosmic rays, gamma rays, x-rays, ultraviolet radiation,

visible light, infrared radiation, microwave, and radio waves.⁴ A better understanding of how to compete in the various elements of the electromagnetic spectrum is the direct result of increased research on each of the aspects of the electromagnetic spectrum. Countries throughout the world have realized that control over the electromagnetic spectrum is imperative to successful military operations. While both friendly and enemy forces compete for battlespace control of the electromagnetic spectrum, technology may be the discriminating factor.

United States Air Force pilots relearned during Operation Desert Storm that smoke and obscurants, both natural and man made can greatly affect the range and lethality of many of their laser guided and line of sight munitions. Even with the increased number of battlefield smart weapons on the battlefield, the use of smoke and obscurants, natural and artificial, can enhance the survivability of friendly forces while degrading the survivability of adversaries. Obscurants on the battlefield are not limited to artificial means; bad weather and cloud cover can also play a significant role in the effects of our precision weapons. From Bosnia in 1995, a *Washington Post* Correspondent reported, “many sorties were scrubbed rather than risk civilian casualties or property damage by releasing precision munitions in soupy weather, since clouds can disrupt the laser beam needed to guide such bombs.”⁵ To achieve full spectrum dominance, we must ensure that our technology truly provides our forces the capability to remain effective and lethal throughout all spectral conditions. Table 3 provides a summary of the characteristics of smoke applications, as they are known today.

Table 3. Smoke Application Characteristics Summary

Application	Objective Statement	Dissemination Methods	Agents Used	Important Considerations
Obscuring Smoke	Blind enemy forces and sensors. Placement on/adjacent to enemy forces. Close area and deep operations.	Projected munitions; rockets, bombs, artillery shells, mortars and grenades	HC, WP, RP, brass flakes (*) fibers	Localized area, short duration. Hasty or preplanned operation.
Screening Smoke	Hide friendly force operations. Placement on or adjacent to friendly troops. Close area and rear areas.	Smoke generators, smoke pots and projected munitions	Fog oil, diesel fuel, (*) fibers (*) flakes	Large area sustained operation. Non-toxic agents preferred.
Protection Smoke	Provide protection from guided and directed energy weapons. Close and rear area operations.	Grenade and chaff dispensers. VEESS.	WP, RP, brass flakes (*) fibers (*) MS agent	Hasty operation
DECOY And MARKING SMOKE	Threat deception. Communication. Location marking. Deep, close and rear area operations.	Grenades, flares and projected munitions	Pyrotechnic mixtures, WP, RP and colored smoke.	Suited to hasty and pre-planned operation.
Training Smoke	Troop training exercises.	Projected, generated and self-protection systems.	Fog oil, PEG, Titanium dioxide	Low cost, safe, non-toxic and environmentally safe.

(*) denotes developmental item, MS=multispectral, HC=haxachloroethane, WP=white phosphorous, RP=red phosphorous, PEG=polyethylene glycol, VEESS=Vehicle Engine Exhaust System

Source: Smoke and Obscurants Engineering Handbook; Volume I: Smoke and Obscurants Overview, Daniel J. Hartman, Engineering Technology, Inc., Orlando, FL 32826 for Edgewood Research, Development & Engineering Center, Aberdeen Proving Ground, MD 210100-5423, September 1995, 10.

In 1985, Navy Sea Systems Command conducted several tests to evaluate the effectiveness of smoke for screening patrol boats from visually aimed threats. Result from the 1985 tests were similar to those obtained years earlier, that smoke and obscurants could be effective in protecting small boats against visually guided weapons, visual-imaging seekers, and in all likelihood, laser-directed weapons.⁶ Naval testers also learned that smoke could be useful in concealing small boats from observers ashore and

from other vessels, and could add confusion to the battle even when observers possessed radar capabilities.⁷ Testers also discovered that smoke clouds provided naval vessels some concealment from observers in helicopters. Another discovery of naval testers was that smoke and obscurant operations were not limited to land and air uses, but could also be effective at sea.

The role of technology and its impact on smoke and obscurants will significantly affect battlefield conditions of the 21st Century. Researchers conducting studies in areas of weapons systems development, smoke systems and materiel development, and combat tactics and doctrine are routinely invited to brief their studies at the annual Smoke and Obscurants Symposium. As discussed in Chapter Three, it is imperative to solicit ideas from science and technology leaders to ensure an exchange of information and relevant technology. Though many studies are scientifically based and probably quite boring to most warfighters, these studies are crucial to battlespace dominance as we move toward the 21st Century. Major General George E. Friel stated in his keynote address during the 1996 symposium, “the Army of the 90’s owns the night because visionary Army leaders exploited the work of visionary scientists who exploited the electro-magnetic spectrum.”⁸ Again, this is another example of the importance of understanding the electromagnetic spectrum and its effect on smoke and obscurant operations in the future.

As Americans vie for spectral control to help our joint forces achieve full spectral dominance, it is imperative we seek systems to ensure our forces continue to rule in daylight and darkness. US military forces must continue to research and solicit support from science and technology leaders. Once commanders can employ systems which will enable them to open and close those windows of observation that General Wooten

addressed in his vision for smoke operations, United States forces will dominate and control 21st Century battlespace.

Notes

¹ Quoted in Bradley L. Moffett, "Expanding our Vision of Jointness: Pursuing Joint Force Development Strategies," in *Essays on Strategy XII*, ed. John N. Petrie (Washington, D.C.: National Defense University Press Publications, 1994), 281.

² Daniel J. Hartman, *Smoke and Obscurants Engineering Handbook Volume I: Smoke and Obscurants Overview*, Engineering Technology, Inc. Orlando FL, produced for Edgewood Research and Development & Engineering Center, US Army Chemical and Biological Defense Command, ERDEC-CR-195, September 1995, 1.

³ Ibid.

⁴ United States Army Field Manual (FM) 3-50, *Smoke Operations*, (Washington, D.C., 4 December 1990), 73.

⁵ Quoted in Major General George E. Friel, Commander Chemical and Biological Defense Command, *Proceedings of the Smoke/Obscurants Symposium XIX Volume 1*, 1997, xxiv.

⁶ Ringwald, M. G., et al. Naval Weapons Support Center, Crane, IN. "An Assessment of Smoke for Use on US Navy Patrol Boats." Staff study, 7-11 October 1985, 66.

⁷ Ibid.,

⁸ Friel, xiv.

Chapter 5

Summary and Conclusions

The nature of modern warfare demands that we fight as a joint team. This was important yesterday, it is essential today, and it will be even more imperative tomorrow.

—General John M. Shalikashvili¹
Chairman of the Joint Chiefs of Staff

As United States military forces enter the 21st Century, they must work closer together than ever before. Major systems acquired by each service must benefit the total joint force team. Weapon systems, communication systems, and other non-lethal systems that ensure battlefield and battlespace dominance will be joint force oriented. Technology transfer and sharing between services is key to developing the capability to dominate on the battlefield. Technology plays a significant role in allowing US commanders to visualize the battlefield under all conditions. Deliberate use of smoke and obscurants will deny an enemy the opportunity to visualize battlefied and battlespace conditions. Dominating the electromagnetic spectrum will significantly influence wars and conflicts throughout the next century. To shape the battlefield and control the windows of visibility, commanders must use smoke and obscurants to increase the level fog and friction of war. Inevitably, deliberate smoke and obscurants will degrade the enemies' ability to view the battlefield. Through advances in technology, these same

deliberate smoke and obscurants will not degrade or affect the weapon systems used by United States military forces.

In Chapter One, the Joint Task Force 2020 scenario described just one way that smoke and obscurants could affect battlefield systems of the next century. Both enemy and friendly commanders will compete to gain critical information about disposition of forces to ensure battlefield awareness and dominance. Smoke and obscurants will remain a critical component of battlefield and battlespace operations throughout the next century. Smoke and obscurants have not outlived their effectiveness and are critical to dominating the 21st Century battlespace.

Although history provides many examples of US successes with smoke and obscurants, 21st Century warfare demands that technology play a greater role in future uses of smoke and obscurants on the battlefield. Whether man made or natural, smoke and obscurants will be present on the 21st Century battlefield. US military leaders must remain focused on ensuring full spectral dominance from the air, on the ground and at sea. Full spectral dominance can only occur through advances in technology and the correlating doctrinal changes. To ensure our technological efforts progress, we must continue to solicit input and advice from leading scientists and technical experts within the civilian population. Our military cannot afford to encounter this task alone.

American forces must learn from the many lessons of smoke and obscurant history. We must continue to search for ways to integrate smoke and obscurants into battle plans, exercises and all joint operations to ensure full spectral dominance through the 21st Century. Just as the Chemical Warfare Service did after World War I, and XX Bomber Command did during World War II, US forces must continue our technological

furtherance to take full advantage of the benefits of deliberate smoke and obscurant operations throughout the entire join environment.

Notes

¹ General John M. Shalikashvili, Chairman of the Joint Chiefs of Staff, *Joint Vision 2010*, (Washington, D.C.: Office of the Chairman of the Joint Chiefs of Staff, no date).

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